



## UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

|                                  |             |                      |                     |                  |
|----------------------------------|-------------|----------------------|---------------------|------------------|
| APPLICATION NO.                  | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
| 10/501,155                       | 07/13/2004  | Koichiro Saga        | SON-2563            | 5207             |
| 23353                            | 7590        | 08/04/2009           | EXAMINER            |                  |
| RADER FISHMAN & GRAUER PLLC      |             |                      | BLAN, NICOLE R      |                  |
| LION BUILDING                    |             |                      | ART UNIT            | PAPER NUMBER     |
| 1233 20TH STREET N.W., SUITE 501 |             |                      |                     | 1792             |
| WASHINGTON, DC 20036             |             |                      | MAIL DATE           | DELIVERY MODE    |
|                                  |             |                      | 08/04/2009          | PAPER            |

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

|                              |                                      |                                       |
|------------------------------|--------------------------------------|---------------------------------------|
| <b>Office Action Summary</b> | <b>Application No.</b><br>10/501,155 | <b>Applicant(s)</b><br>SAGA, KOICHIRO |
|                              | <b>Examiner</b><br>NICOLE BLAN       | <b>Art Unit</b><br>1792               |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If no period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

1) Responsive to communication(s) filed on 17 April 2009.  
 2a) This action is FINAL.      2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

4) Claim(s) 60,61 and 73 is/are pending in the application.  
 4a) Of the above claim(s) 75-99 is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 60, 61 and 73 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

|  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date: _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1668)           | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

**DETAILED ACTION**

1. The amendments to claims 60 and 73 as well as the addition of claims 75-99 filed on April 17, 2009 have been acknowledged.
2. The previous rejection under 35 U.S.C. 112, second paragraph is withdrawn.

***Election/Restrictions***

3. Newly submitted claims 75-99 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: there were no method limitations directed to heating a treatment chamber or heating a supercritical substance in the original presentation.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 75-99 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

***Response to Arguments***

4. Applicant's arguments filed April 17, 2009 have been fully considered but they are not persuasive.

In response to applicant's arguments regarding Mullee '564 failing to teach a liquid form of said supercritical substance being absent from within the chamber, the Examiner does not find them persuasive. The Examiner would like to first begin by discussing the claim limitations as currently amended. The claim limitations do not express when there is no liquid present in the

Art Unit: 1792

chamber. Is the liquid absent upon introduction of the supercritical fluid into the chamber or is it during later processing steps that the liquid is absent? Mullee '564 clearly discloses introducing supercritical CO<sub>2</sub> containing co-solvent into the chamber for cleaning a surface of a wafer [col. 4, lines 37-39]. Mullee '564 also teaches that CO<sub>2</sub> is pressurized to the point of creating supercritical CO<sub>2</sub> prior to being introduced into the chamber [col. 3, line 63 - col. 4, line 11]. There is clear teaching within Mullee '564 that the fluid does in fact undergo processing to become supercritical before it enters the processing chamber. Thus, there is no liquid form of said supercritical substance present in the chamber. Therefore, Mullee '564 does in fact teach the limitation that a liquid form of said supercritical substance is absent from within said chamber.

In response to applicant's argument regarding Mullee '564 failing to teach the conversion of the supercritical substance within the pressure vessel into a gas, the Examiner does not find this persuasive. Mullee '564 teaches depressurizing the pressure vessel to vent the system to atmosphere. Depressurization of the vessel to vent the system to the atmosphere means that the chamber will return to normal pressure and temperature instead of being maintained at the pressure and temperature to maintain CO<sub>2</sub> in its supercritical state. At atmospheric pressure and temperature, CO<sub>2</sub> is a gas. Therefore, the depressurization of Mullee '564 will convert at least some of the CO<sub>2</sub> into a gas. Thus, Mullee '564 does in fact teach converting the supercritical substance to a gas as well as modifying the pressure and temperature of the vessel by lowering them in order to achieve a depressurization within the chamber.

In response to applicant's arguments regarding Vaartstra '165 failing to teach a liquid form of said supercritical substance being absent from within the chamber, the Examiner does not find them persuasive. The Examiner would like to first begin by discussing the claim limitations as currently amended. The claim limitations do not express when there is no liquid present in the chamber. Is the liquid absent upon introduction of the supercritical fluid into the chamber or is it during later processing steps that the liquid is absent? Vaartstra '165 clearly teaches introducing a solution wherein at least one of the components is in a supercritical state [col. 9, lines 13-28]. Vaartstra '165 also teaches that the solution is pressurized to the point of creating a supercritical fluid prior to being introduced into the chamber [col. 9, lines 13-37]. There is a clear teaching with Vaartstra '165 that the fluid does in fact undergo processing to become supercritical before it enters the processing chamber. Thus, there is no liquid form of said supercritical substance present in the chamber. Therefore, Vaartstra '165 does in fact teach the limitation that a liquid form of said supercritical substance is absent from within said chamber.

5. Applicant's argument regarding claim 73 not being addressed, see page 10, filed April 17, 2009, with respect to the rejection(s) of claim(s) 73 under 35 U.S.C. 102(e), has been considered, but is not persuasive. It is clear that claim 73 was in fact addressed in the previous office action mailed February 3, 2009, see the bottom of page 5, but it was accidentally left out of the title located at the top of page 5. As such, the claim is rejected over the same art used in the previous rejection and was in fact clearly rejected in the previous action; therefore, this action is made final.

***Claim Objections***

6. Claim 61 is objected to because of the following informalities: Please correct the status identifier on claim 61. It is no longer a new claim. Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. **Claim 73 is rejected under 35 U.S.C. 102(e) as being anticipated by Mullee et al.**

**(U.S. Patent 6,306,564, hereinafter '564).**

Claim 73: '564 teaches a method for treating a surface (a semiconductor, etc.) with a supercritical fluid, such as supercritical CO<sub>2</sub> that is combined with a co-solvent, such as diglycolamine or ammonium fluoride [col. 2, lines 29-49; col. 4, lines 12-36; col. 5, claim 1].

Regarding the limitation “wherein a liquid form of said supercritical substance is absent from within said treatment chamber,” '564 teaches the pressure vessel contains supercritical CO<sub>2</sub> for cleaning as well as flushes the pressure vessel with supercritical CO<sub>2</sub> *only* [col. 5, lines 4-7].

'564 also teaches depressurizing the pressure vessel before the system is vented to the atmosphere [reads on “converting supercritical substance into a gas form”; col. 5, lines 7-9].

***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. **Claims 60 and 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vaartstra (U.S. Patent 6,242,165, hereinafter '165) in view of Mullee et al. (U.S. Patent 6,277,753, hereinafter '753).**

Claims 60 and 61: '165 teaches a method for treating a surface (of a semiconductor, etc.) with a supercritical fluid, such as supercritical CO<sub>2</sub> that is combined with a co-solvent, such as ammonium hydroxide [abstract; col. 4, lines 29-57; col. 5, lines 14-19 and lines 38-67; col. 6, lines 11-56; col. 7, lines 54-64].

Regarding the limitation "wherein a liquid form of said supercritical substance is absent from within said treatment chamber," '165 clearly teaches maintaining the temperature and pressure at the appropriate amount to ensure supercritical CO<sub>2</sub> exists in order to remove

contaminants on the surface of the structure [col. 7, lines 54-64; col. 8, lines 3-11; col. 9, lines 38-43].

'165 teaches that in order to have carbon dioxide enter the supercritical state it must be at a temperature above 31°C and a pressure above 7.38 MPa [col. 4, lines 5-65]. '165 also teaches that the temperature, pressure as well as the tailoring of additional components (concentration of co-solvents/reactants) of the supercritical fluid mixture is result effective [col. 5, lines 60-67; col. 6, lines 23-45]. It does not teach the specific values for temperature, pressure or the concentration range of ammonium hydroxide. However, '753 teaches cleaning a surface of a substrate with supercritical CO<sub>2</sub> and ammonium hydroxide at a pressure range from 1050-6000 psi, a temperature range from 20-70°C and a concentration of ammonium hydroxide from 0.1-15 v/v% [col. 2, lines 50-67; col. 3, lines 1-10]. In the absence of unexpected results, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to determine the appropriate temperature and pressure of the supercritical fluid and the concentration of its co-solvents, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

***Conclusion***

12. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NICOLE BLAN whose telephone number is (571)270-1838. The examiner can normally be reached on Monday - Thursday 8-5 and alternating Fridays 8-4.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR

Art Unit: 1792

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Nicole Blan/  
Examiner, Art Unit 1792

/Alexander Markoff/  
Primary Examiner, Art Unit 1792